

Complete Listing of the Claims

1 **Claims**

2 **Claims 1-7 (canceled)**

3 **Claim 8.** (previously presented) A method to determine the angle β of the second chamber (6) of
4 the improved refractometer cell (9) of Claim 12 when the refractive index n_g of the transparent
5 material of said cell is known, comprising the steps of

6 A. preparing a fluid whose refractive index n_1 is known;

7 B. filling both chambers of said refractometer cell with said fluid;

8 C. illuminating the cell with a fine beam of light whose vacuum wavelength λ_0 is
9 known,

10 D. measuring the angle of deflection ψ of the transmitted beam

11 E. calculating β from the relation

$$\sin(\psi) = \frac{n_1\sqrt{2}}{2} \left\{ \left[1 - \left(\sin^2(\beta) \left(1 - \left(\frac{n_g}{n_1} \right)^2 f^2 \right) - 2 \sin(\beta) \cos(\beta) \left(\frac{n_g}{n_1} \right) f \left(1 - \left(\frac{n_g}{n_1} \right)^2 f^2 \right)^{\frac{1}{2}} + \cos^2(\beta) \left(\frac{n_g}{n_1} \right)^2 f^2 \right) \right]^{\frac{1}{2}} \right. \\ \left. - \left(\frac{n_2}{n_1} \right) \left[\sin(\beta) \left(1 - \left(\frac{n_g}{n_1} \right)^2 f^2 \right)^{\frac{1}{2}} - \cos(\beta) \left(\frac{n_g}{n_1} \right) f \right] \right\}$$

12 where

$$14 f = \sin(2\beta)g - \cos(2\beta)(1-g^2)^{\frac{1}{2}} \text{ and } g = \left(\frac{n_1}{n_g} \right) \{ \cos(\beta) - \sin(\beta) \} \frac{\sqrt{2}}{2}.$$

15 **Claim 9.** (original) The method of Claim 8 for the case when $\beta \approx 45^\circ$ and n_g is known and said

16 angle β is determined from $\beta = \frac{\sin \psi}{2(n_g - n_1)} + \frac{\pi}{4}$ where said measured deflection angle is ψ .

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1 Claim 10. (canceled)

2 Claim 11. (canceled)

3 Claim 12. (previously presented) An improved refractometer cell constructed of a transparent

4 material of refractive index n_g and comprising

5 A. a first exterior surface (9) and a second exterior surface (14), said first and second

6 exterior surfaces (9, 14) permitting a light beam (1) to pass therethrough so as to enter

7 and exit, respectively, the refractometer cell, and

8 B. a pair of fluid-containing chambers (4, 6) through which said light beam passes, said

9 chambers (4, 6)

10 1) each forming a cavity which contains at least two plane, non-parallel surfaces (10,

11 11 and 12, 13);

12 2) are separated by a transparent window therebetween;

13 3) contain fluids of refractive index n_1 and n_2 respectively, and;

14 4) are characterized in that said chambers comprise entrance and exit beam-passing

15 plane surfaces (10, 11, 12, 13), at least one of which has no other internal beam-

16 passing surface parallel thereto.

17

18 Claim 13. (previously presented) The improved refractometer cell of Claim 12 further

19 incorporating mirror means (15) adjacent and parallel to said second exterior surface (14)

20 causing the beam transmitted therethrough to be reflected back therefrom through said cell and

21 exiting at said first exterior surface (9), where its angular deviation relative to the direction of

22 said incident light beam (1) may be measured thereat.

23

1 Claim 14. (previously presented) The improved refractometer cell of Claim 12 wherein the sides
2 transverse to the incident beam of each chamber (4, 6) form a triangle.

3

4 Claim 15. (previously presented) The improved refractometer cell of Claim 14 wherein said first
5 chamber (4) forms an isosceles right triangle of 45° base angles (α), said second chamber (6)
6 forms a triangle with one 45° base angle (α) and a second angle (β) less than 45° yielding a third
7 angle greater than a right angle, and the hypotenuse (11) of the isosceles right triangle of said
8 first chamber (4) is parallel to the longest side (12) of the triangle of said second chamber (6).

9

10 Claim 16. (new) A method to measure the refractive index of a fluid, n , using the improved
11 refractometer cell of Claim 12 comprising the steps of

- 12 A. filling both chambers of said cell with a fluid of known refractive index;
- 13 B. passing a fine beam of light therethrough;
- 14 C. measuring the deflection angle ψ' of the emerging beam;
- 15 D. filling both chambers of said cell with said fluid whose said refractive index value n
16 is to be measured;
- 17 E. measuring the deflection angle ψ of the emerging beam;
- 18 F. calculating said refractive index value n from said measured values of ψ' and ψ .

19

20 Claim 17. (new) A method to measure the refractive index difference, Δn , of two fluids of
21 refractive index n_0 and $n_0 + \Delta n$, respectively, using the improved refractometer cell of Claim 12
22 comprising the steps of

- 23 A. filling both chambers of said cell with a reference fluid of refractive index n_0 ;

- 1 B. passing a fine beam of light therethrough;
- 2 C. measuring the deflection angle ψ' of the beam emerging therefrom;
- 3 D. replacing said reference fluid in one of said chambers of said cell with said second
- 4 fluid of refractive index $n_0 + \Delta n$;
- 5 E. measuring the deflection angle ψ of the emerging beam;
- 6 F. calculating said refractive index value difference Δn between said two fluids from
- 7 said measured values of ψ' and ψ .